A New Mindset for Emergency Response

How state and local governments can use technology to create more sustainable, reliable and resilient operations
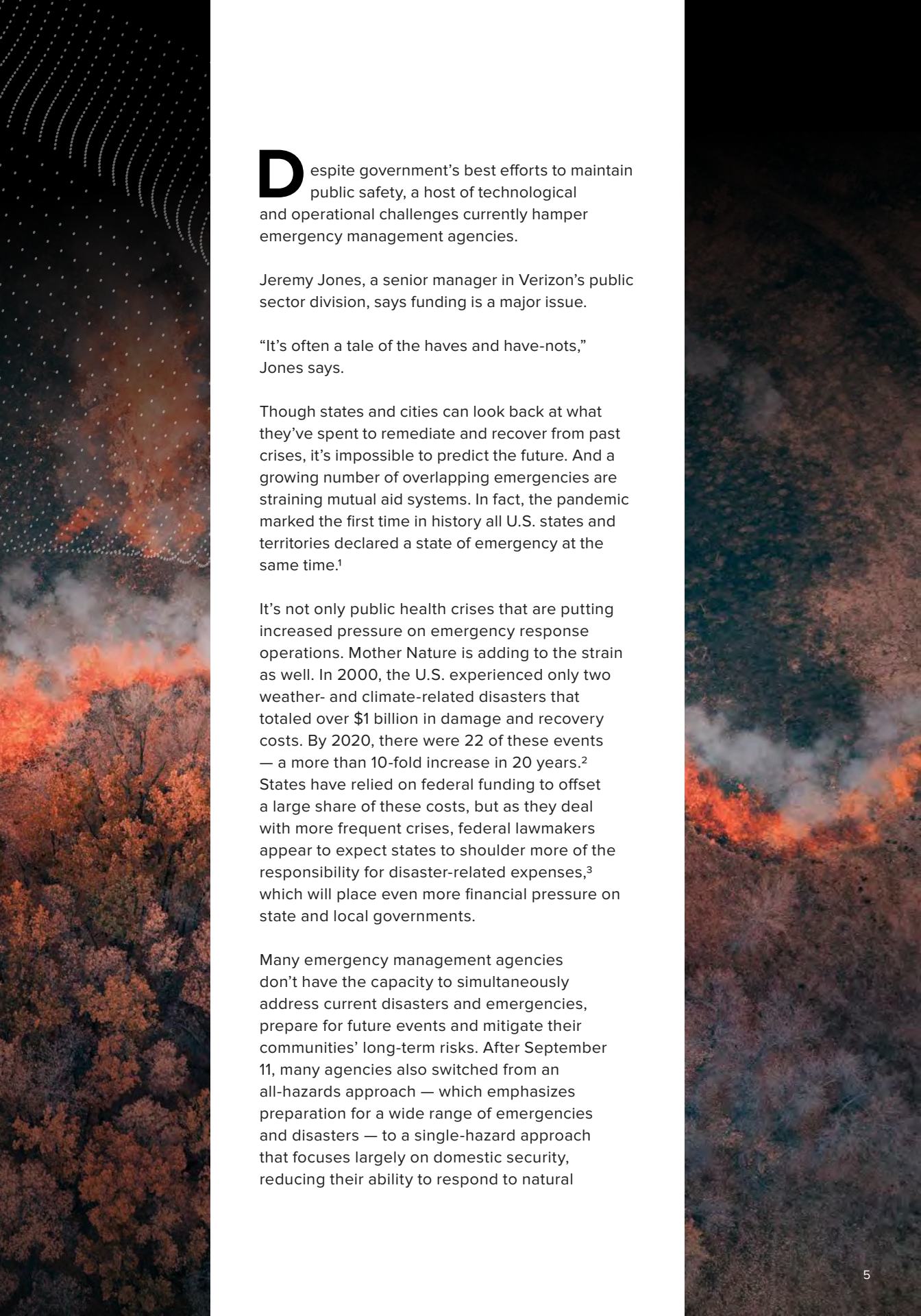
Introduction

State and local governments encounter a range of emergencies — from natural disasters and extreme weather to public health crises, mass casualty incidents and cyberattacks.

The COVID-19 pandemic shifted our understanding of what an emergency is and what our response to an emergency can look like. As the nature of emergencies changes, so too must the tools, technologies and processes governments use to address these events. States and localities must forge modern, nimble emergency management operations that improve first responders' situational awareness, put relevant data at their fingertips and better equip them to respond.

Technologies like 5G, the Internet of Things (IoT), artificial intelligence (AI) and other emerging innovations can help agencies improve emergency response and create more sustainable, reliable and resilient emergency management operations. Here's how state and local governments can lay the groundwork for modern emergency management.

Confronting Disaster

Current Challenges in Emergency Response

Despite government's best efforts to maintain public safety, a host of technological and operational challenges currently hamper emergency management agencies.

Jeremy Jones, a senior manager in Verizon's public sector division, says funding is a major issue.

"It's often a tale of the haves and have-nots," Jones says.

Though states and cities can look back at what they've spent to remediate and recover from past crises, it's impossible to predict the future. And a growing number of overlapping emergencies are straining mutual aid systems. In fact, the pandemic marked the first time in history all U.S. states and territories declared a state of emergency at the same time.[1]

It's not only public health crises that are putting increased pressure on emergency response operations. Mother Nature is adding to the strain as well. In 2000, the U.S. experienced only two weather- and climate-related disasters that totaled over $1 billion in damage and recovery costs. By 2020, there were 22 of these events — a more than 10-fold increase in 20 years.[2] States have relied on federal funding to offset a large share of these costs, but as they deal with more frequent crises, federal lawmakers appear to expect states to shoulder more of the responsibility for disaster-related expenses,[3] which will place even more financial pressure on state and local governments.

Many emergency management agencies don't have the capacity to simultaneously address current disasters and emergencies, prepare for future events and mitigate their communities' long-term risks. After September 11, many agencies also switched from an all-hazards approach — which emphasizes preparation for a wide range of emergencies and disasters — to a single-hazard approach that focuses largely on domestic security, reducing their ability to respond to natural

disasters.[4] Embracing an all-hazards approach — and a more integrated, collaborative style of emergency management planning — is key for agencies to prepare for the full range of natural disasters their communities might face.

Limited resources also restrict system modernization within agencies. Many municipalities rely on public safety answering points (PSAPs) that lack interoperability. Usually managed at the county level, PSAPs are call centers that transfer, route or directly answer 911 calls in a jurisdiction. The capabilities of PSAPs vary by area. Some jurisdictions may have sophisticated emergency response systems that interface with other systems, such as computer-aided dispatch systems, video and gunshot detection systems, or criminal records systems. On the other hand, LonGene Leonard, enterprise architect for private 4G, 5G and MEC at Verizon, says some PSAPs must deal with decades-old communications infrastructure, where calls are "still coming over the publicly switched telephone network — the class 4 or class 5 switches that have been out there for decades that are hooked together around the country."

Non-interoperable legacy IT leads to ongoing challenges with data collection for agencies at a time when they are confronting increased data complexity. Agencies collect data from disparate sources, including federal and state partner and law enforcement agencies, 911 calls, SMS messages from constituents via emergency texting services, social media, video surveillance systems and more. Bringing all this information together to drive situational awareness or gather insights for real-time crisis response can require a herculean effort.

Technology inefficiencies also contribute to limited near real-time communication with various stakeholders, including members of

emergency response teams, agency staff, third-party emergency services, security personnel, the public and the media. This limitation hinders agencies' responsiveness, whether it's the ability to issue alerts to warn constituents about a public health outbreak in their community or share social media reports with emergency response teams on the scene of a mass casualty event.

Jones says a growing mental health crisis also puts more pressure on emergency services.[5] This crisis increases the need for first responders to work more collaboratively with their social services counterparts and undergo more training, such as crisis intervention training.[6]

Emergency management agencies must also confront new cybersecurity threats. These threats require agencies to advance their technology maturity to better support proactive disaster recovery planning and risk management activities.

"Agencies are having to become more sophisticated from an emergency response standpoint because cybercriminals have become more sophisticated," Jones says. "Ten years ago, someone getting an email with malware that could take down an entire network was not as big of a threat. Cities, counties and municipalities have been forced to change."

As state and local governments deal with more cyber threats, natural disasters and public health emergencies, they'll need to wield advanced tools to build more effective emergency response operations. Technologies such as 5G, IoT, AI and other solutions can provide the modern connectivity governments need to fortify their communications infrastructure, increase their resilience and expand their capacity to respond to emergencies. ■

In 2000, the U.S. experienced only two weather- and climate-related disasters that totaled over $1 billion in damage and recovery costs. By 2020, there were 22 of these events — a more than 10-fold increase in 20 years.

Leveraging New Solutions

5G, IoT, AI and Advanced Connectivity

As agencies face changing community needs, a growing climate crisis and evolving public safety challenges, several emerging technologies can help them build more resilient and equitable emergency management operations.

▌Tapping the power of 5G

5G, or fifth-generation wireless technology, provides significantly more powerful, reliable and faster connectivity compared to 3G and 4G wireless networks. This technology, which relies on software-based cellular technology rather than hardware, uses high-frequency millimeter radio waves to transmit data faster and increase network resilience and performance.

5G's advanced network capabilities enable new data-intensive digital applications. 5G can power technologies that emergency management agencies need to conduct proactive planning and expand their capacity. It provides connectivity to support drones for aerial surveillance and low-latency image and video transfer to help with disaster mapping, and has the speed, reliability and data-processing capabilities necessary for early warning systems. 5G also offers high-performing network connectivity and bandwidth that can speed the flow of information between first responders in the field and staff at emergency command centers — thus ensuring first responders receive critical information when it could save lives.

5G improves reliability for emergency response networks. It will be able to facilitate network slicing, which could create standalone, dedicated virtual networks for emergency communications.[7] For example, 5G could enable a network

slice for push-to-talk communications for firefighters battling wildfires or for disaster recovery teams responding to a tornado, letting them communicate with other members of the emergency response team in real time. This capability is critical because emergency management centers must often share networks, which affects the capacity, reliability, latency and performance of these networks. When a crisis occurs, an influx of calls can stretch one of these networks to its limit. Within agencies' current network environment, every piece of traffic is often treated the same, whereas 5G can drive network optimization that allows emergency personnel to efficiently share critical data.

Connecting data with IoT

IoT powers intelligent, connected devices that give emergency responders real-time visibility into disaster-affected locations, areas at risk for extreme weather events and emergency incidents in progress.

IoT facilitates seamless, secure data transmission from one device to another using sensor-based technologies. It underlies several solutions that support emergency response operations, including remote-sensing technologies that help officials create disaster projection models, air and water quality monitoring systems, and wildfire detection systems that allow fire service agencies to detect forest fires as well as elevated temperatures and carbon dioxide levels. IoT-enabled devices can be invaluable for disaster recovery, including

search and rescue operations and monitoring of post-disaster conditions and stockpiles of critical emergency resources. Additionally, the technology can provide real-time data that improves situational awareness for first responders. For example, data from IoT-enabled devices such as body cameras, heat sensors and carbon monoxide detectors can feed information into cloud-based incident response platforms[8] that inform decision-making for first responders and emergency management leaders during times of crisis.

IoT also supports data collection and analysis for flood planning and mitigation. This allows municipalities to identify areas most at risk for recurring floods and then implement proactive measures to reduce the probability of disaster. By FEMA's estimates, nearly 24 million properties in the U.S. are at risk for flooding,[9] so IoT-enabled flood mitigation systems could potentially prevent millions of people from being displaced or losing their homes — or worse, their lives.

Harnessing AI-driven automation and analysis

AI automates tasks that would take a human much longer to complete. Its most significant boon for emergency management is its ability to streamline data collection and analysis. AI provides the data-processing capabilities agencies need to analyze data from social media,

resident reports and text messages, police body cams and dashboards, video surveillance systems and other sources. It simplifies data complexity for emergency management agencies, helping them unearth insights from structured and unstructured data and harness that information for forecasting, planning and real-time response. For example, first responders could use AI-enabled devices to gather critical health metrics, such as heart rate and blood pressure, when they arrive on the scene of a major emergency. Using a secure platform, these devices could then transmit such information to local hospitals so doctors and nurses have timely information about the condition of patients before they arrive for treatment.

AI also supports speech-to-text analytics solutions that allow agencies to analyze conversations between 911 dispatchers and the public, providing real-time sentiment analysis, real-time transcription to better serve callers who speak different languages and automatic routing of calls to the right place depending on the content of the conversation.

AI supports geospatial systems that help agencies with disaster planning and recovery, allowing staff to extract information from imagery and spatial data in a way they couldn't quickly achieve with human eyes or labor. AI is beneficial for post-disaster recovery as well. It powers satellite image technologies that enable more timely and equitable distribution of emergency aid during disasters and can help agencies identify at-risk areas, classify damage and pinpoint optimal delivery routes for disaster relief in local communities.

AI isn't just valuable during disasters — it can help municipalities address everyday public safety needs. For example, some cities have used AI and IoT-enabled 5G cameras to monitor parks, streets and other public spaces for street racing, drug activity and other potential crimes. The technology allows cities to gather data from sensor-based devices in these locations, analyze the information in real time and respond accordingly if an incident poses a public safety threat.

/ Orchestrating mobile response

Much of the work of emergency response teams takes place in the field, so they need modern network infrastructure that supports them wherever they may be.

Mobile command centers fulfill this need. This scalable solution is purpose-built for rapid deployment in less-than-optimal environments — whether it's for crews fighting wildfires or hazmat teams responding to a chemical spill. Mobile command centers facilitate real-time mobile communications in the field, leveraging mission-critical kits, wireless routers and voice over internet protocol (VoIP) phones, and battery-operated Wi-Fi hotspots in weatherproof boxes.

Mobile command centers have already been deployed by some cities and states. As emergency response efforts become more complex, these communication centers will become an even more critical part of maintaining resilience in times of crisis. ■

Improving Emergency Response

Lessons from State and Local Governments

/ Aiding recovery and resilience after Alabama tornadoes

Tornadoes represent one of the biggest threats to emergency response, particularly when they destroy communications infrastructure that would allow first responders to serve as an invaluable resource to residents and businesses. Facing such a disaster, officials in Lee County, Alabama, adopted a mobile command solution. The county leveraged Verizon's network and solutions to deploy a wireless emergency communications center that had device-charging components, computer workstations, and wireless phones and tablets, along with a mobile command trailer that provided satellite connectivity to support first responders in the field.[10]

/ Maintaining pandemic communications in the Southeast

During the pandemic, jurisdictions across the country (and the globe) scrambled to provide critical public health information to residents. Many governments set up hotlines for constituents seeking COVID test information or answers to other public health questions.

In the Southeast U.S., several counties used Verizon One Talk, a cloud-based phone system that connects to mobile devices, desk phones and PCs, to launch hotlines on the fly.[11] The solution allowed the counties' public health departments — many of which had employees working remotely — to maintain business continuity and increase their call center capacity during a major ongoing disruption.

The Harris County Sheriff's Office uses mobile wireless technology to collaborate with health officials when responding to mental health-related calls. Overall, 73% of county deputies say the combination of a clinician and wireless solution has helped them de-escalate a situation.

Though the counties used the solution to respond during a crisis, the situation also illustrates how advanced wireless communication technologies can serve cities and states in their everyday operations. Whether it's to provide vaccine information throughout the year or facts about upcoming mobile health clinics or new family health programs, these technologies can help jurisdictions reduce resource constraints and develop more nimble emergency response operations.

Confronting a mental health crisis in Harris County, Texas

The country's ongoing mental health crisis has played out on a micro level in local communities. Harris County, Texas, which includes the city of Houston, is no exception.

To improve outcomes for residents who live with mental illness, the Harris Center for Mental Health and Intellectual and Developmental Disability has leaned on wireless network technologies. The center, a state-designated authority, has more than 2,400 employees across 86 locations and often collaborates with law enforcement on crisis interventions. The Clinician and Officer Remote Evaluation (CORE) program, a joint initiative between the center and the Harris County Sheriff's Office, is one such collaboration. The program's crisis intervention team relies on mobile tablets, virtual collaboration and real-time connectivity capabilities, and secure communication lines to respond to mental health-related calls. The solutions provide mobility for officers and allow them to connect with mental health clinicians in real time. This system also enables staff to connect residents to the wraparound services and support they need.[12]

Overall, 73% of Harris County deputies say the combination of a clinician and wireless solution has helped them de-escalate a situation. This combination has also allowed Harris Center to engage individuals who may not have otherwise sought mental health services — showcasing how technology can empower law enforcement, first responders and mental health clinicians to more effectively support their communities. ■

Building More Resilient Emergency Management Operations

A Checklist for State and Local Governments

As state and local governments assess ways to build more resilient emergency management operations, they should keep the following best practices in mind.

✔ Embrace AI, IoT and the cloud

With more and more data coming into law enforcement departments and emergency command centers, these organizations can no longer rely on on-premises systems alone. To be more agile, they need to embrace the cloud, AI and IoT-driven solutions.

AI provides powerful data automation capabilities that can streamline data collection and analysis. Agencies can apply this technology for several purposes, including automated data collection for PSAPs, predictive analytics for disaster planning and crisis simulations. IoT-driven solutions can help agencies collect location-specific, real-time data, which will facilitate more proactive detection and monitoring and improve relief and rescue operations.

"Every second counts for first responders, and by combining the capabilities of AI and IoT, these technologies can improve emergency response times," says Cory Davis, assistant vice president of Verizon Frontline.

The cloud is the foundation for many of the AI- and IoT-enabled solutions agencies can use to improve emergency response. Verizon's Leonard says many agencies are beginning to realize the importance of the cloud and are consuming cloud services to lower costs, integrate new technologies and advance interoperability. The cloud offers the flexibility and scalability needed to modernize emergency management, so agencies should consider expanding their technology capabilities by adopting solutions such as cloud-based incident response platforms,

data management platforms and next-generation 911 systems, among others.

✔ Build network resilience

As agencies integrate cloud-based solutions into their technology environment, they also need to build their network resilience to fully support these technologies. Verizon's Jones says this is why it's critical for agencies to build redundant networks.

"You have to start with an understanding of what's available to your area. You also have to plan for the worst, and the way I would do that is redundancy, redundancy, redundancy," he says.

To achieve redundancy, organizations can work with a network provider to install multiple routers, switches and other network devices

As agencies integrate cloud-based solutions into their technology environment, they also need to build their network resilience to fully support these technologies.

to avoid a single point of failure and ensure minimal downtime during disruptions. Taking these steps will help agencies maintain operational continuity when a major weather event or natural disaster affects cable or fiber lines and impedes the flow of communication.

✔ Partner with a network provider

Agencies should consider working with a strategic technology partner to get the connectivity they need.

As they assess partners, agencies should ask a network provider how many assets (both equipment and human) are located in their local area; how the provider defines interoperability; whether the provider has towers with battery and satellite backups; and how its network solutions operate during emergency incidents in terms of reliability, bandwidth and prioritization of network traffic.[13]

Agencies should also assess a provider's services and expertise. Jones says Verizon's network and crisis response teams often work in concert with agencies as they try to build out their network infrastructure. This allows them to share their experiences across countless implementations about how to prepare for the worst, as they've seen virtually every possible scenario an agency

Conclusion

5G, AI, IoT, mobile command centers and other network solutions can give emergency management agencies the network reliability, performance and availability they need to expand their response capabilities, maximize the value of new digital platforms and cloud-based solutions, and do more with the finite resources they have. More importantly, these solutions can contribute in meaningful yet immeasurable ways to protect the public and the first responders who selflessly sacrifice their lives for them.

"Knowing that the solutions we offer to first responders helps keep them and their constituents safe — that ultimately somebody makes it to the hospital on time, that they were able to respond to a scene on time or that somebody is still alive today because of it — is really rewarding," Jones says. ■

can imagine. Verizon has even held events where it has brought together agencies from across the country to simulate disaster management, recovery and response scenarios.

"We've simulated a number of different events and put technology on display so officers and emergency response agencies can see the technology that's out there and what's available to them," Jones says, adding that many of these solutions are more cost effective and easier to implement than agencies realize.

✓ Conduct joint training sessions

Agencies should conduct joint training exercises on blue sky days with their technology partners to emulate the type of emergencies in which responders may need to operate.

These exercises can help agencies gauge their mission-critical communications capabilities, strategize about what to do if there is a communications failure and get first responders more comfortable with network communications tools — which can make these tools even more impactful in moments when seconds could mean the difference between tragedy or saved lives. ■

This handbook was created by the Government Technology Content Studio, with information and input from Verizon.

Endnotes:
1. https://www.domesticpreparedness.com/resilience/moving-on-from-2020-a-future-for-emergency-management
2. https://www.governing.com/now/extreme-weather-events-push-emergency-managers-to-the-limit
3. https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2020/09/how-states-can-manage-the-challenges-of-paying-for-natural-disasters
4. https://www.riskandresiliencehub.com/challenges-facing-emergency-managers-today
5. https://www.mhanational.org/issues/state-mental-health-america
6. https://www.apa.org/monitor/2021/07/emergency-responses
7. https://www.verizon.com/business/solutions/public-sector/public-safety
8. https://www.verizon.com/business/resources/articles/s/benefits-of-connected-technology-for-emergency-responders
9. https://riskfactor.com/about
10. https://www.verizon.com/about/news/verizon-supports-communities-impacted-recent-alabama-and-georgia-tornadoes
11. Jeremy Jones Verizon SME interview
12. https://www.verizon.com/business/resources/customer-success-stories/harris-county
13. https://www.verizon.com/business/en-nz/resources/articles/first-responders-have-you-heard-these-myths

Produced by: **government technology**

Government Technology is about solving problems in state and local government through the smart use of technology. Government Technology is a division of e.Republic, the nation's only media and research company focused exclusively on state and local government and education. **www.govtech.com**

Sponsored by: **Verizon Frontline**

The advanced network for first responders on the front lines.
https://www.verizon.com/business/solutions/public-sector/public-safety/